REMARKS/ARGUMENTS

Claim Amendments

By the claim amendments presented, Claim 30 is rewritten to incorporate into the main body of the claim the feature in the claim preamble of catalyst cycling from the reaction zone to the regeneration zone and from the regeneration zone to the reaction zone. This amendment thus simply involves editorial rewriting of Claim 30 to include within the main body of the claim those elements of the process set forth in the claim preamble and also described in Paragraph **[0041]** of the original specification.

Also by the claim amendments presented, Claim 33 is rewritten to indicate that the making of olefins from the oxygenate feed occurs in a reaction zone as set forth in Paragraph **[0012]** of the original specification. Claim 33 is also rewritten to indicate, as in Claim 30, that the catalyst which is "further heated" by combustion of fuel in the regeneration zone is catalyst which is taken from and returned to the reaction zone also as described in Paragraph **[0041]** of the original specification.

Upon entry of the amendments presented, Claims 30-35 remain in the application. No additional claims fee is due as a result of these amendments.

Invention Synopsis

The present invention as currently claimed in this application is directed to processes for adding heat to or initially increasing the temperature of a reactor system for converting oxygenates to olefins. This is accomplished by heating catalyst in the catalyst regeneration zone of such a reactor system by combusting a heating fuel which is added to the regeneration zone along with the catalyst. The heating fuel is one which must have certain specified autoignition characteristics. This fuel also has no more than certain maximum amounts of contaminants such as sulfur, nitrogen, nickel, and vanadium which should not find their way back to the OTO reactor. Catalyst taken from the reaction zone and heated in this manner in the regeneration zone is then circulated back to the oxygenates-to-olefins (OTO) reaction zone. This procedure can thus be used to add heat to the OTO reactor either during initial startup or during periods of feed interruption.

Art Rejection

During pre-RCE prosecution, Claims 30-35 were rejected under 35 USC §103(a) as being allegedly unpatentably obvious over Lattner et al. (U.S. Patent No. 6,023,005, hereinafter "Lattner") in view of Harandi et al. (U.S. Patent No. 4,939,314, hereinafter "Harandi"). In both the Final Rejection and the Advisory Action issued during pre-RCE examination, the Examiner maintained the position that the process claims are obvious over these patents. This is because the Examiner urges that it would have been obvious to add heating fuel to the catalyst regeneration zone of the Lattner OTO set-up in view of the Harandi disclosure of generally characterized "fuel gas" added to the regenerator of the Harandi oligomerization process, to thereby arrive at Applicants' claimed processes. Such a rejection is again respectfully traversed as it would apply to the claims as amended herein.

By way of review, Lattner discloses an oxygenates to light olefins (OTO) process wherein a catalyst regenerator is used to remove coke deposits from only a portion of the total catalyst inventory in the OTO reaction zone so as to improve selectivity of the process to production of light olefins. Harandi discloses a high pressure olefin oligomerization process, e.g., the Mobil Olefins to Gasoline (MOG) process or the Mobil Olefins to Distillate (MOD) process or the Mobil Olefins to Lubes (MOL) process, which includes an on-line low pressure catalyst regeneration set-up. Catalyst from and to the Harandi oligomerization reactor is passed through pressure adjusting lock hoppers (and a stripping zone) to and from a low pressure catalyst regenerator. For purposes of temperature control in the catalyst regenerator, and while recirculating catalyst is being held and processed in the lock hoppers or stripping zone, Harandi discloses very generally that a fuel gas may be added to the regenerator to maintain an appropriate temperature in the regenerator.

Applicants would reiterate several of their basic reasons why the Lattner/Harandi reference matrix would not have obviously suggested the process now set forth in Applicants' amended claims. Applicants would also provide herein their response to some of the points raised by the Examiner in both the Final Rejection and the ensuing Advisory Action during pre-RCE prosecution.

One of Applicants' basic arguments has been that the skilled artisan operating a Lattner-type OTO process and faced with the problem of increasing OTO reactor temperature initially or maintaining OTO reactor temperature during periods of no oxygenate feed to an OTO reactor would never turn to the Harandi reference in the first place. There is simply nothing in the Harandi disclosure that would lead the skilled artisan to believe that some aspect of the Harandi catalyst regeneration setup in a MOG, MOD, or MOL process could be used to solve the skilled artisan's OTO process problem of heat addition to the OTO reactor.

The Examiner urges that since both types of processes use the same general reactor/regenerator arrangement, and since both use oxygen in the regenerator to burn coke from deactivated catalyst, it would therefore have been obvious and appropriate to combine the teachings of these two references. However, as noted in Harandi, the catalyst coking in the disclosed MOG/MOD/MOL process is surprisingly light, and the withdrawal and regeneration of Harandi catalyst is accordingly slight and intermittent. The interruption in catalyst feed to the Harandi regenerator is what leads to the potential need in Harandi to add fuel gas to the regenerator to maintain regenerator temperature at an appropriate level. The operator of the Lattner OTO process faces no such problem since coking is heavier in the OTO process, and regenerator temperature maintenance is not generally an issue. The Harandi reference therefore concerns a significantly different type of process and is not addressing the problem solved by the present invention. Harandi thus provides no mention of the heat-to-reactor problem and, as discussed in greater detail just below, provides no hint of using catalyst heated in the regenerator to add extra heat back to an OTO reactor to address the problem. In short, the skilled artisan would have no reason to look to Harandi as a way to modify Lattner and expect any advantage from so doing.

Another of the Applicants' basic arguments is that the combined teachings of Lattner and Harandi simply do not result in a process wherein extra heat imparted to catalyst in the regenerator by burning fuel therein is carried back to the reactor by this further heated catalyst. The Examiner has urged, in the first place, that Applicants' claims do not properly include this element either because the cycling of catalyst from the reactor to the regenerator and back to the reactor is only mentioned in the preamble of Applicants' claims. Applicants would note that by

the claim amendments presented herein the two independent claims in this application now do recite the cycling of catalyst between reactor and regenerator in the body of the claims. This amendment should thus obviate this basis for the Examiner's objection to Applicants' arguments.

Further, there is simply no indication or suggestion in Harandi that fuel combustion in the regenerator is used to further heat catalyst which then carries such heat back to the Harandi oligomerization reactor. There are several reason why this is the case. In the first place, burning of the fuel gas added to the Harandi regenerator is merely used to replace the combustion of coke on catalyst during periods when no coked catalyst is being fed to the Harandi regenerator. It is apparently not used to add additional or further heat to catalyst already in the regenerator over and above that which is provided by coke combustion. Secondly, catalyst from the regenerator in Harandi is fed back to the reactor in relatively small amounts through a vented lock hopper wherein it is combined with relatively cool oligomerization reactor feed. So the regenerated Harandi catalyst would not be expected to deliver any significant amount of "further" heat to the Harandi reactor and would be expected to have been cooled from its regenerator temperature to one not much different from the reactor temperature by the time the regenerated catalyst re-enters the Harandi reactor.

Finally, it is submitted that combining the teachings of Harandi with Lattner would not lead the skilled artisan to select and use only the type of heating fuel in the regenerator which contains acceptably low levels of sulfur, nitrogen and metal compounds as contaminants. The Examiner urges that the very general indication in Harandi of fuel gas introduction into the regenerator would read on fuel gas containing no contaminants and would therefore suggest the low contaminant element of Applicants' claims.

In response, Applicants would note that there are certainly many types of "fuel gas" materials known in the refining and petrochemical art, and many of them would be expected to contain at least some contaminants such as those Applicants' claims put concentration limits on. There is, in fact, no suggestion in Harandi of the need to minimize the presence of such nitrogen, sulfur and metal compounds in the Harandi fuel gas for any reason. In short, there is no suggestion in the applied reference combination of Applicants' claim element involving selection of certain types of relatively uncontaminated heating fuel for use in the regenerator.

Given all the foregoing considerations, it is again submitted that the reference combination of Lattner in view of Harandi is not one which is properly made in rejection of Applicants' claims in the first place. And even if made, the combined teachings of these two patents still do not suggest the particular process embodiments set forth in Applicants' Claims 30-35 as presently written. Continued rejection of these amended claims under 35 USC §103(a) over Lattner in view of Harandi would therefore be improper.

CONCLUSIONS

Applicants have made an earnest effort to place their application in proper form and to distinguish their claimed invention from previously applied prior art. WHEREFORE, entry of the amendments presented herein, consideration of Applicants' remarks concerning the previously applied art rejection, as well as allowance of amended Claims 30-35, are all respectfully requested.

Any comments or questions concerning the application can be directed to the undersigned at the telephone number given below

Respectfully submitted,

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